
Lahontan Regional Water Quality Control Board

February 10, 2017

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Draft Data Gap Well Installation and Soil Sampling Report, Non-CERCLA Site OT071, Former George Air Force Base, Victorville, San Bernardino County

The California Regional Water Quality Control Board, Lahontan Region (Water Board) staff received the *Draft Data Gap Well Installation and Soil Sampling Report, Non-CERCLA Site OT071, Former George Air Force Base* (GAFB; Report) on December 13, 2016 and this letter provides comments from the State of California. More specifically, this letter provides comments from the Water Board and, in the enclosure, comments from the Department of Toxic Substances Control.

The Report documents the methods, procedures, and results of the Site OT071 data gap investigation conducted in 2016. The objectives of the investigation were twofold:

1. To fill data gaps identified in the Draft Corrective Action Plan for Pesticides (PCAP) in Groundwater (MWH, 2011) and during discussions between the Air Force and the Water Board. The proposed wells were intended to further characterize the lateral and vertical extent of the dieldrin plume at specific locations identified by the Air Force and the Water Board.
2. To acquire dieldrin concentration data from shallow site soil samples for vadose zone modeling. The samples will also provide soil property data (geotechnical data) for use in the vadose zone and groundwater modeling for Site OT071.

Five wells and five direct-push technology (DPT) borings were installed to meet these objectives in accordance with the approved work plan (CB&I, 2016). Additional evaluation of results from the investigation will be provided in the revised PCAP.

The following comments are provided so that future versions of the Report will more effectively document the results of the data gap investigation. Please incorporate the suggested changes and provide a response to comments table. Water Board staff also recommends that the Air Force provide a Word file with tracked changes for the text when the next version of the Report is issued to facilitate document finalization.

PETER C. PUMPHREY, CHAIR | PATTY Z. KOUYOUMDJIAN, EXECUTIVE OFFICER

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GENERAL COMMENTS

General Comment 1

One of the primary objectives of the Report was to fill data gaps that were identified at Site OT071. Five wells were installed to further characterize the lateral and vertical extent of the dieldrin plume. The draft Report was issued in December 2016 without including the analytical results for groundwater samples collected from the five new wells in October 2016. We understand that these groundwater data have now been validated and request that the draft final version of the Report be revised to include 1) the analytical results for groundwater samples collected from the five new wells, 2) an isoconcentration map for dieldrin in the Upper Aquifer for all wells sampled during the October 2016 groundwater sampling event, and 3) an isoconcentration map for dieldrin in the Lower Aquifer for all wells sampled during the October 2016 groundwater sampling event. While these requested elements may also be included in the next Basewide Annual Groundwater Monitoring (AGM) Report, the AGM reports are issued as final and typically not until May or June of the following year, preventing the timely reconciliation of any identified issues. Including these elements in the Report will allow the Air Force to proceed with the revised PCAP in a more timely manner.

SPECIFIC COMMENTS

Specific Comment 1, Page 3-3, 4th Paragraph, 2nd Sentence.

There appears to be an error in the screen slot size: change "0.20-inch" to "0.02-inch" to be consistent with the well completion information on the corresponding boring log in Appendix B.

Specific Comment 2, Page 3-4, 2nd Paragraph, 2nd Sentence.

Please change "0.20-inch" to "0.02-inch" to be consistent with the well completion information on the corresponding boring log in Appendix B.

Specific Comment 3, Page 3-5, 2nd Paragraph, 2nd Sentence.

Please change "0.20-inch" to "0.02-inch" to be consistent with the well completion information on the corresponding boring log in Appendix B.

Specific Comment 4, Page 3-6, 2nd Paragraph, 2nd Sentence.

Please change "0.20-inch" to "0.02-inch" to be consistent with the well completion information on the corresponding boring log in Appendix B.

Specific Comment 5, Page 3-6, 6th Paragraph, 2nd Sentence.

Please change "0.20-inch" to "0.02-inch" to be consistent with the well completion information on the corresponding boring log in Appendix B.

Specific Comment 6, Page 4-1, 3rd Paragraph, 3rd Bullet.

This bullet states that the detection limits were higher than expected, so the method was used on additional samples. Please provide further explanation on the cause of the elevated detection limits. For example, were the detection limits elevated due to matrix interference effects? Were the detection limits elevated when the additional samples were analyzed by this method?

Specific Comment 7, Page 4-2, Table 4-2.

Please explain the “—” symbol in the table, either as a footnote to the table or in the text. Apparently, it was not always possible to analyze dieldrin as total, amount that passed the 0.70 micron filter, and amount that passed the 0.45 micron filter due to limited sample volume.

Specific Comment 8, Page 4-2, 1st Paragraph.

Please add a new bullet to describe that the dieldrin concentrations detected in soil in 2016 at locations where previously high concentrations were detected in 2008 were consistently lower than the earlier results, but still exceeded the residential Regional Screening Levels (RSLs) for dieldrin in soil. This is an important point to document for the conceptual site model that will be updated in the revised PCAP.

Specific Comment 9, Page 5-1, 1st Paragraph, 3rd Sentence.

This portion of Section 5.0 (Discussion) states that “Additional characterization of the lateral and vertical extent of the Dieldrin plume will be presented in later documents once the modeling is completed. As described in General Comment 1, staff recommend that the groundwater sampling results for the five new wells be presented in this Report. Please revise the text accordingly.

Specific Comment 10, Page 5-1, 3rd Paragraph.

This section provides an interpretation for the depth of the top of the Middle Lacustrine Unit (MLU) at new well MW-159. Please add text to clarify that 1) the Upper Aquifer occurs above the MLU contact, 2) most of the screen was installed in the MLU (not the Upper Aquifer as proposed), and 3) why the newly installed well is representative of the Upper Aquifer.

Specific Comment 11, Page 5-1, 4th Paragraph.

This section provides an interpretation for the depth at new well MW-160 where the top of the MLU occurs (~163 feet). Please add text to clarify that 1) the Upper Aquifer occurs above the MLU contact, 2) the screen was installed entirely within the MLU (not the Upper Aquifer as proposed), and 3) why the newly installed well is representative of the Upper Aquifer.

Specific Comment 12, Page 5-1, 5th Paragraph.

Well MW-161 was installed to provide a Lower Aquifer well adjacent to Upper Aquifer well MW-160. Please add text to clarify 1) the depth to the Upper Aquifer – MLU contact (~163 feet) based on the more complete stratigraphic profile collected during the drilling of the adjacent well MW-160, 2) the depth to the MLU – Lower Aquifer contact (~195 feet), 3) the screen installed from ~291 to 311 feet below grade was installed entirely within the Lower Aquifer.

Specific Comment 13, Page 5-2, 1st Paragraph.

Well MW-162 was installed to provide a Lower Aquifer well at this location. The first paragraph provides an interpretation for the depth interval at new well MW-162 for the MLU (~148-200 feet below grade). Please add text to clarify that 1) the Upper Aquifer occurs above the MLU (above 148 feet below grade), 2) the Lower Aquifer occurs below the MLU (below 200 feet below grade), and 3) the well screen was installed entirely within the Lower Aquifer.

Specific Comment 14, Page 5-2, 2nd Paragraph.

Well MW-163 was installed to provide a Lower Aquifer well at this location. The second paragraph provides an interpretation for the bottom of the MLU, which at this eastern location appears to grade laterally into the Permeable Lacustrine Zone (PLZ). Please add text to clarify that 1) the Lower Aquifer occurs below the MLU/PLZ (below ~ 119 feet below grade), 2) the lithologic distinction between the MLU/PLZ and the Lower Aquifer becomes less pronounced at locations like MW-163 as fine-grained layers pinch out and become less common to the east, 3) the well screen was installed mostly within the Lower Aquifer, and 4) why the screened interval at this location produced a water level intermediate between the levels measured in the Upper and Lower Aquifer in areas further west.

Specific Comment 15, Page 5-2, 4th Paragraph, 1st Sentence.

This sentence states that “MW-159 was screened across the top of the Upper Aquifer to...” As discussed in Specific Comment 12, most of the screen was installed in the MLU. Please revise the text accordingly.

Specific Comment 16, Page 5-2, 5th Paragraph, 1st Sentence.

Please revise the text as follows: “MW-160 was located south of NZ-125 and paired with MW-161 to assess the southeastern portion of the Upper Aquifer plume.”

Specific Comment 17, Page 5-2, 5th Paragraph, 4th Sentence.

This sentence states that “MW-160 is located in the proposed position and is screened in the aquifer to monitor...” As noted in Specific Comment 13, the screen was installed entirely within the MLU. Please revise the text accordingly.

Specific Comment 18, Page 5-3, 3rd Paragraph.

Please revise this paragraph based on Specific Comment 16. Considering that the stratigraphic distinction between the MLU/PLZ and the Lower Aquifer becomes less distinct at the location of this well and the measured groundwater level is between the water levels measured in the Upper and Lower Aquifer in adjacent areas to the west, it probably does not make sense to include the groundwater level measured in MW-163 in the contouring of the Lower Aquifer.

Specific Comment 19, Figure 1-2.

We request that a note be added to this figure to indicate the date of the aerial photograph to provide context for comparison to the following figure 2-1 that contains an historical aerial photograph from 1994.

Specific Comment 20, Figure 2-3.

We request that the groundwater flow direction lines be redrawn or relocated so that they cross each of the groundwater elevation lines at 90 degrees. Note that the green groundwater flow lines on Figure 2-3 in the draft Report did not honor this hydrologic requirement.

Specific Comment 21, Table 1-1 in the Table Section.

For well MW-159, there appears to be an error in the Top of Casing Elevation for MW-159, which is listed as the same elevation as the Ground Surface Elevation (2833.74). Revise the Top of Casing Elevation (or Ground Surface Elevation), as appropriate.

Specific Comment 22, Table 1-1 in the Table Section.

The Top of Casing (TOC) Elevation for MW-159 appears to be incorrect according to the TOC elevation of 2837.04 feet above mean sea level listed in Appendix G and consistent with the previous comment. Subtracting the Depth to Groundwater (100.08 feet below TOC) from this revised TOC elevation (2837.04), results is a Groundwater Surface Elevation of 2736.96 feet above mean sea level for well MW-159, as listed in Table 1-1.

ADMINISTRATIVE COMMENTS**Administrative Comment 1, Page 1-1, 4th Paragraph, 1st Bullet.**

Water Board staff requests that this bullet point be revised as follows:

“Results of groundwater monitoring ~~scheduled for~~ completed in October 2016.”

Administrative Comment 2, Page 2-1, 3rd Paragraph, 1st Sentence.

We recommend that this sentence be revised as follows:

“The ~~main apparent~~ mechanism for carrying Dieldrin from the surface to the groundwater was ~~unlimited~~ heavy irrigation of the housing area and golf course.”

Administrative Comment 3, Page 2-3, 5th Paragraph, Last Sentence.

We recommend that this sentence be revised as follows:

“On the northeast side of Site OT071, flow is ~~east~~ northeast toward the river.”

Administrative Comment 4, Page 3-8, Section 3.3 (Surveying).

We recommend adding a reference to Appendix G (Survey Report) to this section.

Administrative Comment 5, Page 4-2 and the Tables Section.

We recommend a more consistent approach for the placement of tables in the Report. In the draft Report, Table 4-2 is inserted in the text, while the other tables are provided in the Tables section. We recommend either 1) placing all the tables in the Tables section or 2) placing all the short tables in the text and moving the very long Table 4-1 (Results of Chemical Laboratory Analysis) to an Appendix.

Administrative Comment 6, Page 4-3, 5th Bullet.

Please define BV (bulk volume) and GV (grain volume).

Administrative Comment 7, Page 4-3, 4th (Last) Paragraph.

Please clarify that the potentiometric surfaces shown for the Upper Aquifer and Lower Aquifer in Figures 4-1 and 4-2, respectively, are based on April 2016 water level measurements. This is in contrast to the groundwater elevations for the five new wells, which were based on October 2016 measurements.

Administrative Comment 8, Page 5-2, 6th Paragraph, 1st Sentence.

We recommend that this sentence be revised as follows: “...the southern portion of the Lower Aquifer plume where Dieldrin has been detected...”

Administrative Comment 9, Page 5-3, 1st Paragraph, 2nd Sentence.

We recommend that this sentence be revised as follows: “...is screened in the aquifer to monitor the southeastern portion of the plume in the ~~lower aquifer~~ Lower Aquifer.”

Administrative Comment 10, Page 5-3, 2nd Paragraph, 1st Sentence.

We recommend that this sentence be revised as follows: "...to assess the central portion of the Lower Aquifer plume.

Administrative Comment 11, Page 5-3, 2nd Paragraph, 4th (Last) Sentence.

We recommend that this sentence be revised as follows: "...and is screened in the aquifer to monitor the southeast portion of the plume in the lower aquifer Lower Aquifer."

Administrative Comment 12, Page 5-3, 4th Paragraph, 1st Sentence.

We recommend that this sentence be revised as follows: "The newly installed data gap wells ~~will be~~ were samples for analysis of Dieldrin and measured for water levels as part of the October 2016 annual sampling event.

Administrative Comment 13, Table 1-1 in the Table Section.

We recommend revising the Drilling Method for MW-161 to "HSA/Mud Rotary."

Administrative Comment 14, Table 1-1 in the Table Section.

Please expand the height of the row for MW-162 so the entire drilling method of "HSA/Mud Rotary" appears. This drilling method was truncated in the draft Report.

If you would like to discuss these comments in a conference call or if you have any questions regarding this letter, please contact me at (760) 241-7340, Todd.Batthey@waterboards.ca.gov or Lauri Kemper at (530) 542-5436, Lauri.Kemper@waterboards.ca.gov.



Todd Batthey PG
Engineering Geologist

Enclosure: DTSC comment letter dated 17 January 2017

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MEMORANDUM

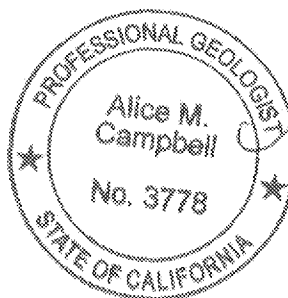
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FROM: Alice Campbell, PG, CEG, CHG
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CONCUR: Craig Christmann, P.G.
Senior Engineering Geologist
Chatsworth Geological Services Unit

DATE: January 17, 2017

SUBJECT: Data Gap Well Installation and Soil Sampling Report, Non-CERCLA Site
OT071, dated December 2016, by CB&I Federal Services LLC, for Former
George Air Force Base, Victorville, California.



PCA: 14718 Site Code: 400071-47 Work Request No. 20025728

Introduction:

At your request, Chatsworth Geological Services Unit (GSU) staff has reviewed the Draft Data Gap Well Installation and Soil Sampling Report for Non-CERCLA Site OT071 described above and dated December 2016. The Data Gap Report describes work done to address two data gaps in the Pesticides Corrective Action plan for this site. Organochlorine pesticides (OCPs), primarily dieldrin, have been detected in onsite soil and groundwater beneath and downgradient of the site. There is also a substantial groundwater mound present in shallow groundwater beneath the site that may be a key factor in the distribution of the pesticides in groundwater. Modeling studies (not a part

of this report) are underway to investigate the distribution and fate of the OCPs, and the data gaps needed to be addressed to allow modeling to proceed. Five new groundwater wells and five soil borings were drilled and sampled for this study. This review focuses on data quality, especially as it relates to CSM data gaps and use of the data in modeling contaminant flow and transport.

Comments.

1. Section 2.0 Background. A figure would be helpful to identify the locations of the landfill, housing area, golf course, the storage pond, decorative ponds, and the water tower.
2. Section 2.0 Background. The last paragraph is contradicted by the results of the study. Irrigation of the golf course has not been shown to have caused the mound. Instead, the main contributor to the mound has been the leaking of the storage pond, which supplies both the golf course and the Mojave energy plant. Figure 2-2 does not show a mound beneath the golf course even though the kriging flattens the eastern gradient. A triangular interpolation of the 2016 water level dataset (attached below) shows a very steep change in slope that barely crosses the road onto the golf course. The paragraph should be revised.
3. Section 2.0 Background. The groundwater mound, while near the golf course, is not beneath the golf course but upgradient of it.
4. Section 2.1 The MLU/PLZ 'clay' is actually silt, see the next comment. The terminology should be revised.
5. Section 4.2, Geotechnical Analyses. Sieve analyses showed that clay is actually a very minor part of the soils that were analyzed. Most of what is being called clay in the boring logs is actually silt with minor amounts of clay. Some of the very fine sand is being called silt in the boring logs. The results of the geotechnical testing should be mentioned in the boring logs, and the discrepancies should be discussed in the text, because the lithologic descriptions used in modeling are drawn mainly from boring logs, and systematic bias in terminology in boring logs will lead to a low bias in hydraulic conductivity.
6. Section 5. The lithology discussion should include the geotechnical data, particularly for the MLU. The MLU, based on the lab data, appears to be a silt with a little clay, not a clay. Some high plasticity silts (MH) may have also been missed and called clay. The discrepancies are important because the lithologic data will be used in computer modeling.

7. Section 5. Last page. 'Adjacent' need not be capitalized. The 40-foot difference between two adjacent wells with different screen centers shows strong downward gradients consistent with vertical gradients within the Lower Aquifer and shown on Lithology Cross Section B-B'. Sections B-B' and E-E' should include the water levels for both MW-149 and MW-163. The lower aquifer water level line should not use MW-149 but instead use MW-163, because their screens are approximately horizontal with one another, unlike MW-149. The text should be revised to interpret the meaning of the difference in water levels between the two wells.
8. Figures. Figure 2-2. Figure 2-2, the kriged 2016 contours, do not show a groundwater mound under the golf course, which is consistent with the origin upgradient of the golf course. The TIN contours of the 2016 water level dataset (attached below) show that the eastern gradient is much steeper than the western groundwater gradients, both in the Upper and the Lower aquifers.
9. Figure 2-2. The 2016 dieldrin results for the new wells would be a useful addition to the figure.
10. Figures. Cross sections. Based on the geotechnical analysis, much of what is being called clay, particularly the MLU, appears to be silt. The sections should be reviewed to check whether the picks are based on lab or field data, and adjusted as necessary.
11. Cross sections. The lines representing the 'water table' are clearly based on wells with screens not on the same horizontal plane, and do not accurately show the flow system. Flow is three-dimensional, not two-dimensional, and the mismatched screens obscure vertical flow elements. Hydraulic sections, where pressure head at the screen is contoured in the vertical plane, would more clearly show vertical flow in the upper and in the lower aquifers. The sections should be revised.
12. Cross Section formatting notes. Clay is hard to distinguish on the sections because reviewer is somewhat red-green blind. The red lines in on a red background aren't sufficiently distinct. The dieldrin concentrations are impossible to read without a magnifier, perhaps changing the font to black and bold would help. The California Dept. of Water Resources used warm colors for the coarsest material, and cool colors for fine units, with red, orange, and yellow for gravel, coarse and fine sands, pale yellow for silty sands, and blues, grays and greens for clays and silts. Having clay as red/brown and gravel as orange requires extra work for the reader to remember the arbitrary colors, rather than a simple color ramp from coarsest to finest going from warm to cool.

13. Figure 4-1. Similar to the comment on the cross sections, using a color ramp on the groundwater contours that goes from red to green is likely to be invisible to people with imperfect red-green vision. <https://www.usability.gov/get-involved/blog/2010/02/color-blindness.html> can be consulted for additional information.
14. Table 1-1. The Top of Casing elevation for MW-159 is in error. The correct number from Appendix G is 2837.04. The corresponding WSE is then 2836.96. The date(s) of water level measurement should be noted in the table notes. Are they from spring 2016?
15. Table 4-3. The table is difficult to read because the font is so small. A larger size would be useful.
16. Appendix B, Boring logs. When geotechnical data is obtained, the lab classifications should be mentioned on the boring logs, because they provide an objective basis for the USCS classification. In many cases, the fines visually identified as silts appear to be misclassified on the boring logs as lean clays, and some fine sand is being called silt in the boring logs. There are also several places where the USCS symbol does not match the description. For example, MW-159 at 27 ft is shown as SP but described as silt. Dilatancy information is missing for many of the materials logged as silt and clay. Fine sands, silts, and clays can be distinguished in the field, but only if all the observations in the USCS field method are collected and logged. The boring logs should be checked again.
17. Appendix B, MW-159 at 105. The last sample mentions sandstone nodules in a lean clay (which is more likely a silt). This suggests syndepositional liquefaction of the sediments. This observation is consistent with defects in the MLU being partly caused by clastic dikes or sand boils during large nearby earthquakes. The description of the MLU should include mention of clastic dikes being a possible mechanism for leakage in the MLU.
18. Appendix C, Well development. The well development logs for the new wells indicate that redox measurements were not consistently taken at all the wells. ORP/redox measurements are essential to verify the DO measurements. DO readings of over 10 are generally suspect; specifically, too-high readings often occur when the membrane in the meter fails. For example, at MW-161, ORP was 31mV but DO was 13.46 mg/L. These two measurements are not likely to both be true at the same time, because one means reducing conditions and the other means highly oxidizing conditions. ORP and DO should be rechecked

when the wells are routinely monitored, using a different meter, and if the results are inconsistent, the DO should be flagged as questionable.

Conclusions and Recommendations:

1. GSU recommends soils lab data be added to the boring logs and update the USCS classification as needed to match the grain size distribution from lab analyses. Places where the text discusses lithology should be revised.
2. GSU recommends miscellaneous changes to improve readability of the figures.
3. The cross sections should be revised to show hydraulic head contours, not an arbitrary 'water table'.
4. GSU recommends adding a groundwater contour map using TIN, even if buried in an appendix, to expedite review. 2016 TIN maps for the Upper and Lower zones are attached.
5. GSU recommends the report be accepted providing the described issues are satisfactorily addressed.

Questions regarding this memo should be directed to Ms. Alice Campbell by contacting her at 818-717-6623 or acampbel@dtsc.ca.gov.

